









Consiglio Nazionale delle Ricerche



PhD course

ROME TECHNOPALION ECOSYSTEM

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Istituto di Struttura della Materia









Biosensors and Green Immobilization Techniques

PhD course held by the Council of National Research (CNR)

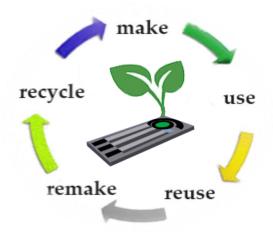
5 lessons

online

10 hours

At the end: Visit to CNR laboratory





9 February 2024 CNR Istituto di Struttura della Materia

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Biosensors and Green Immobilization Techniques



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The course aims to introduce and understand the operating principles of a biosensor, the methodologies for its development, its fields of application, and "**green**" production strategies for a more eco-friendly manufacturing of the device. The course also includes seminars with experts in the field and a day visit to **DepEST lab**, the green immobilization laboratory which uses the ElectroSpray Deposition technique at CNR-ISM Research Area in Rome 1, Montelibretti (RM).

Competence Area

- Energy Transition (EnT)
- Health & Bio-Pharma (H&BP)









Teaching Goals/Objectives

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Students will acquire basic knowledge of the **structure** and **operation** of a biosensor, its **fields of application**, and the most common **manufacturing techniques**, with a more conscious perspective towards the use of disposable devices.

- L 1: What is a biosensor
 - Development of a biosensor and its characteristics.
- *Biosensor components*: bioreceptors (DNA, aptamers, proteins, enzymes, antibodies, cells) transducer (amperometric, potentiometric, calorimetric, optical, gravimetric)
 - *Applications*: healthcare, environmental monitoring and food quality control



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Teaching Goals/Objectives



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- L 2: Types of biosensors: I, II, III generation.
 - Other classification: Catalytic (enzymatic),

Affinity (immunosensors),

Optical (lateral flow, NP)

- **L 3:** Bioreceptor immobilization:
 - physical methods (absorption),
 - chemical methods (covalent bonding, crosslinking, bioaffinity),

working principle of the electrospray ionization method



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Teaching Goals/Objectives

- L 4: green immobilization using electrospray deposition technique and comparison with other immobilization methods
 - expert seminar





- ACS Sustainable Chem. Eng. **2022**, 10, 1888–1898.
- Green Chem. 2023, 25, 5257

Lesson 5: visit to the CNR-ISM dep-Est laboratory in Montelibretti



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Learning Outcomes

- By the end of this course/module, you will be able to:
- o describe a biosensor
- o compare different immobilization techniques
- classify the biosensors by type
- o describe the electrospray deposition technique
- o identify the green aspect of a biosensor

Final Assessment

written test like multiple choice questionnaire

Feedback Questionnaire

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Reference Details

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Thank you for your attention!!

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